

BioE 439/539: Applied Statistics for Bioengineering and Biotechnology

Spring 2019

Course Description:

This semester-long course aims to provide an introduction to statistics and statistical analysis, with emphasis on application to data generated from biomedical and biotechnological experiments. After completion of the course, students will be able to use statistics as an analytic tool for describing data, testing hypotheses, designing experiments, and critically evaluating conclusions.

Meeting Time & Location:

TTh 8:00am - 9:15 am, Location BRC 285

Course Instructors

Dr. David Zhang dyz1@rice.edu	BRC Room 425 Office Hours: by appointment
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Teaching Assistants	
Pavan Kota	TBD
Pavan.k.kota @rice.edu	Office Hours: TBD

Method of Instruction

This class will contain lectures, 9 optional problem sets as homework, a midterm, and a final exam. Both the midterm and the final exam are take-home. Coursework will cover both material from listed textbooks as well as material from lectures. **Please bring your Matlab-installed laptop whenever you attend class.**

BioE 539 additional requirements: Additional problems will be assigned for both problem sets and for midterm/final.

Course Information:

Course information, including problem sets and example solution sets, can be found at the course website: <http://nablab.rice.edu/bioe439/>

Course Readings

There is no required textbook for the course. Online lecture notes cover all necessary materials. For reference, students may optionally consult:

1. "Biostatistics," 10th edition, by Wayne Daniel and Chad Cross, published by Wiley.

Grading Criteria:

Students will be graded according to one of two criteria, whichever produces a more favorable grade for the student.

Option 1:

Problem Sets	20%
Midterm Exam	32%

Final Exam	48%
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Option 2:

Midterm Exam	40%
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Final Exam	60%
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Problem Sets:

Problem sets are due at the beginning of class, on the due dates. As the problem sets are optional for the course grading, **no late problem sets** will be accepted. You may turn in your problem sets either physically in paper, or email them to your TA.

Grading Disputes:

If you believe that a mistake has been made in grading your problem sets or exams, please first consult your TA. If you cannot reach satisfactory resolution with your TA, you may appeal to Dr. Zhang, but be warned that a failed appeal will result in **a grade penalty** of -5% on the relevant problem set or exam.

Honor System Policy:

Students are expected to adhere to the Honor Code and follow the guidelines given in the Blue Book. Exams are given under the honor system. Students are encouraged to bring any concerns involving academic integrity to the attention of the instructor. More information can be found at honor.rice.edu

Schedule:

Tues 1/8	NO CLASS	
Thurs 1/10	1: Matlab refresher; Probability	
Tues 1/15	2: Descriptive Statistics	
Thurs 1/17	3: Sampling from Data	
Tues 1/22	4: Sensitivity and Specificity	PS 1 out
Thurs 1/24	5: Receiver Operator Curves (ROC)	
Tues 1/29	6: Analog Tests and Predictions	PS 1 due, PS 2 out
Thurs 1/31	7: Linear and Polynomial Fits	
Tues 2/5	8: Stock Market Data	PS 2 due, PS 3 out
Thurs 2/7	SPRING RECESS (No class)	
Tues 2/12	9: Multiple Linear Fits and Numerical Optimization	
Thurs 2/14	10: Arbitrary Fits and Numerical Optimization	PS 3 due, PS 4 out
Tues 2/19	11: Arbitrary Fits and Numerical Optimization	
Thurs 2/21	12: Training and Test Sets	PS 4 due, PS 5 out
Tues 2/26	13: Gaussian Distribution and Parameter Estimation	
Thurs 2/28	14: Midterm Review	PS 5 due, MIDTERM EXAM out
Tues 3/5	15: Central Limit and Confidence Intervals	
Thurs 3/7	16: Mean Standard Deviation and t-Distribution	MIDTERM EXAM due
Tues 3/12	SPRING BREAK (No class)	
Thurs 3/14	SPRING BREAK (No class)	
Tues 3/19	17: t-Distribution and Hypothesis Testing	PS 6 out
Thurs 3/21	18: Two-way t-Tests	
Tues 3/26	19: Two-way t-Tests	PS 6 due, PS 7 out
Thurs 3/28	20: Chi Squared Distribution	
Tues 4/2	21: Chi Squared Distribution	PS 7 due, PS 8 out
Thurs 4/4	22: Analysis of Variance	
Tues 4/9	23: Analysis of Variance	PS 8 due
Thurs 4/11	24: Analysis of Variance	
Tues 4/16	25: Final Exam Review	FINAL EXAM out
Thurs 4/18	NO CLASS	
Tues 4/23	NO CLASS	FINAL EXAM due